



Features

- Fully solid-state transmitters
- Compact, modular design
- High resolution, accuracy, and sensitivity
- Fast installation and easy maintenance
- Low life-cycle costs
- Built-in automatic calibration
- Graceful degradation
- Light-weight pedestal
- Built around RVP900™ and IRIS™ software

Vaisala Weather Radar WRS400 is a dual-polarization X-band radar that uses solid-state transmitters.

Solid-state transmitters

Solid-state power amplifier (SSPA) transmitters provide increased observation accuracy, sensitivity, and tracking quality. The ultra-wideband performance virtually removes the risk of frequency interference.

The life-cycle costs of the SSPA transmitters are low because they do not require replacement of expensive consumable parts, in contrast to tube-based transmitters.

Thanks to continuous calibration, there is no calibration downtime.

Improved coverage and data

X-band frequency provides measurement data with high resolution and excellent precision for short-range meteorological surveillance.

By filling gaps in radar networks, the X-band weather radar improves radar network coverage, for example, in mountainous areas, rain catchment areas, and around wind parks.

Compact design

The compact weather radar is designed for fast installation and easy maintenance.

The transceiver is located at the back of the antenna, so only a short waveguide structure is needed. The simplified signal path provides improved sensitivity.

The simplified structure requires no RF rotary joints, waveguide switches, or site-specific parts. This enables increased data quality, reliability, and lower costs.

Because there is no need for a large equipment room, the site construction work is less extensive, and maintenance costs lower.

Graceful degradation

WRS400 has an independent SSPA transmitter for H channel and V channel. The radar design is based on reliable and redundant modules; even if one of the key components fails, the system will still maintain limited functionality. The failing component can be replaced fast and easily without an extensive break in operation.

Technical data

Operating environment for units in the radome

Operating temperature	-40 ... +55 °C
Operating humidity	0 ... 100 %RH, condensing
Operating altitude/Ambient pressure	Up to 3000 m Up to 700 hPA
IP class for pedestal and transceiver	IP54

Antenna

Reflector diameter	1.4 m or 2.4 m
Type	Center-fed parabolic reflector
Gain (minimum)	For 1.4 m antenna: >40 dBi For 2.4 m antenna: 45 dBi
Beam width	For 1.4 m antenna: <1.8° For 2.4 m antenna: <1°
Peak sidelobes at main polarization planes	<-25 dB
Cross-pol isolation at main polarization planes	<-30 dB
H/V alignment (squint angle)	<0.1°

Pedestal

Type	Semi-yoke elevation over azimuth
Acceleration	20°/s ²
Position accuracy	±0.05° accuracy
Azimuth steering	360°
Vertical steering	-2 ... +92° or better
Scanning rates	Up to 40°/s

Transmitter

Type	Fully solid-state, SSPA-based transmitters. Transmitters for H and V channels are separate and independently-modulated.
Frequency range	9300 ... 9700 MHz Selectable in 100 MHz bands and tunable within the range.
Peak power	SSPA 200 W (H) + 200 W (V) SSPA 400 W (H) + 400 W (V)
Pulse width	1...90 µs
Duty cycle	Max. 10%
Max pulse repetition frequency	3 kHz
Polarization	Simultaneous Transmit and Receive (= STAR) Horizontal-only Vertical-only

Radar controller

Type	Vaisala RCP8 with IRIS Radar
Scan modes	PPI, RHI, Volume, Sector, Manual, Rapid Scan
Local display	Real time, Ascope, BITE, products

Receiver

Type	RF front-end, dual-channel digital receiver for horizontal and vertical polarization
Noise figure	≤3 dB
Linear dynamic range	95 dB or better
Image rejection	80 dB or better (with WG filters)
Recovery time after Tx pulse	≤5 µs

System specifications

Input power	Voltage: 230 ±10 %, 50 ... 60 Hz ± 3 Hz (single-phase)
Power consumption	Typical: 1200 W
Phase stability	0.5° or better
Total weight of radar (antenna, pedestal, transceiver)	With 1.4 m antenna: approx. 340 kg With 2.4 m antenna: approx. 370 kg

Signal processing

Azimuth averaging	2 ... 1024 pulses
Clutter filters	IIR, fixed, and adaptive width GMAP
Dual PRF velocity de-aliasing	2:3, 3:4, or 4:5 for 2X, 3X, or 4X de-aliasing
High sensitivity mode processing	> 3 dB improvement detection gain
IF digitizing	16 bits, 100 MHz in 5 channels
Number of range bins	Up to 8168 per channel
Optional data outputs	I/Q
Processing modes	PPP, FFT/DFT, Random Phase 2nd trip filtering/recovery
Range resolution	N*22 m
Range de-aliasing by random phase	

Radome

Property	Value
Typical outside diameter	For 1.4 m antenna: 2400 mm For 2.4 m antenna: 3700 mm
Type	Quasi-random (dual-polarization)



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